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Analyzing the Acceptance of Digital Library System by Students and Librarians

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Analyzing the Acceptance of Digital Library System by Students and Librarians

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ABSTRACT

This study investigates the acceptance of digital library system (Digilib system) by students and librarians of the State Islamic University of North Sumatera (UIN Sumatera Utara) Medan. It highlights the system's rate of acceptance from the perceived usefulness (PU), perceived ease of use (PEOU), behavioural intention to use (IU), and actual system usage (AU). Furthermore, the study investigates the problems in using the system and the users' strategy in coping with the problems. Data were collected using an online survey from 186 respondents, comprising 26 librarians and 160 students. A quantitative approach was applied using a TAM model to measure the acceptance rate from perceived usefulness, ease of use, intentional behaviour to use, and actual system usage. The rate of Digilib system acceptance by the users of UINSU was low, with the contribution of 22.4% of PU, 28.3% of PEOU, 29.9% of IU and 7.2% of AU. Based on the findings, librarians need to re-evaluate the existing system to further understand the causes of low acceptance.

Keyword: digital library, digital library acceptance, user acceptance, TAM in the digital library, library of UIN Sumatera Utara

A. *INTRODUCTION*

The Digilib system is derived from the word digital library. This term first appeared in July 1945 when Vannevar Bush felt that there were difficulties in accessing published information due to the manual print model method. This idea was outlined in the writing entitled As We May Think (Cleveland, 1998; Johnson & Magusin, 2005; Saleh, 2010; Testiani, 2015). The word digital refers to two digits on a computer, ones and zeros, called binaries. These are data that are manipulated and stored in a computer(Johnson & Magusin, 2005, p. 2). The word digital connotes the use of computers as tools in accessing information.

The library of the State Islamic University of North Sumatera (UINSU) is one of the libraries that have utilized information technology to improve the organization's operations. This is reflected in the integrated library system through collection processing, circulation and reference services, OPAC (Online Public Access Catalog) tracking, collection digitalization and internet usage in accessing and disseminating information.
UINSU Digital Library is an information system used by UIN Library of North Sumatera Medan in organizing library management. The information system is a result of the collaboration between UIN

Library of North Sumatera Medan and PT. Gamatechno Indonesia. This system was launched in 2015 as a forum for campus library management. It presents the latest library information potentially useful to users. Also, it has OPAC (Online Public Access Catalog), enabling users to search for collections online without visiting the library.

In the implementation, the acceptance of Digital Library system based on user utilization is still not known, despite the advantages of the information system. This is due to the lack of evaluation regarding the acceptance of the Digital Library use at the State Islamic University of North Sumatera.

Former researches proved that the trust in the system increases its acceptance. This automatically increases satisfaction with the use of the system. These researches prove that there is a relationship between trust towards the rate of Digilib system acceptance and satisfaction. A trusted system guarantees user satisfaction (Kassim, Jailani, Hairuddin, & Zamzuri, 2012). Similarly, a satisfied user continuously makes use of the system.

This study determines the rate of Digilib system acceptance based on analysis of **UINSU Digital Library System Acceptance with the Technology Acceptance Model (TAM) Approach**. The study explores data about Digilib system usefulness rate by users, system convenience, user interest in using the system and the actual system usage rate.

B. PREVIOUS FINDINGS

Many studies have been conducted on technology acceptance, both directly related to library information technology and other fields, also utilizing technology. The different variables used in previous studies left no basic components of the TAM theory, which included perceived usefulness, perceived ease of use, perceived behaviour, intention to use, and actual system usage. The description below explains the previous studies.

Arif Surachman (2007), *Analysis of Library Information System (Sipus) Version 3 Acceptance in Gadjah Mada University (UGM).* Research using TAM analysis displayed user acceptance rates against SIPUS version 3 systems. Independent variables were Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), while the dependent variable was acceptance. Results concluded that independent variables influenced the dependent variable by 63.8%, while the remaining percentage was attributed to other factors.

Arnila Purnamayanti (2014), *Utilization of Information Technology "M-Library" Mobile Application Services: Quantitative Study at UGM Yogyakarta Library. Postgraduate Information Management and UGM Library. Thesis*. The study problem was the factors influencing the utilization of UGM M-Library application using the Technology Acceptance Model (TAM) theory. From the results, out of the 12 study hypotheses, 9 were accepted while 3 were ejected.

Arif Surachman (2013), *Analysis of the Effect of Perceived Usefulness, Perceived Ease of Use, Subjective Norm, Mobility, and Use Situation on Individual Intention in using M-Library. Postgraduate Information Management and UGM Library. Thesis. 2013.* This study examined the variables in the TAM 2 model by adding mobility and use context variables that influenced the behavioural intentions of using mobile technology. The research showed the conformity test results of fit model. Out of the 8 study hypotheses tested, 5 were proven at the significance levels of 0.05, 0.01, and 0.001.

Ade Abdul Hak (2016) conducted the study on the acceptance of Scansnap SV600 + Rack 2-Filer digitalization technology by students of Library Science study program, titled *The Study on Acceptance of digitization Technology for Students of Library Science Department, UIN Syarif Hidayatullah Jakarta* (Hak, 2016). Hak explained that students' acceptance of the Scansnap SV600 + Rack 2-Filer technology system was very high. Accordingly, students happily used this system because it was fun and had easy features. Furthermore, the scan provided faster and better results. The ease of use affects usability with an effective value of 0.332, the influence of attitudes on behaviour by 0.234, while the perceived ease of use affects the intention to use by 0.292. Hak concluded that the training to use Scansnap SV600 + Rack 2-Filer media by Library Science students needed improvement. This is very important because competence

in using these tools must be mastered by a prospective professional in the library and information science fields.

Research on digital library acceptance (PD) has long been a concern. Studies from various approaches have also been conducted by experts in the PD field, since 1995, 1998 and 2001, focusing on development and application.

Thong et al. (2004) examined the acceptance of library users to PD application systems in Hong Kong. Accordingly, 9 factors influence user acceptance of the PD application system. System acceptance was mainly based on its usability and usefulness. Utilization directly influences user acceptance because their users prefer functional systems. The easier a system interacts with its users, the more it will continuously be preferred. The 3 categories of external factors affecting user acceptance of PD include display characteristics because the system interface is the user's main access door to PD. Other factors include the organizational context (governance) of PD, and individual differences believed by users to be the final determinant of PD acceptance. Display characteristics include clarity of terms, display design, and navigation clarity. Governance context includes relevance, system accessibility and visibility. Finally, individual differences include computer usefulness to individuals, the experience of computer use, and knowledge.

Park et al. (2009) examined Digital Libraries acceptance in 16 institutions in 3 developing countries from Asia, Africa and Latin America. Results showed that the ease of use of the library system perceived by the user significantly influenced the usefulness of the system, eventually achieving the behavioural desire to use the system. This conclusion is further compared to the 3 countries. In this study, Park et al. conclude that external variables affecting the ease of use perceived by users and its usefulness need to be considered as very important factors in designing, implementing, and operating a Digital Library system. This consideration helps reduce the mismatch between system design and the reality of local users, facilitating success in adopting Digital Library systems in developing countries.

Teherdoost (2018) stated that 3 factors influence technology acceptance, including quality, safety and satisfaction. This conclusion was presented as a research result on the e-service technology (ETAM) system acceptance. Accordingly, ETAM helps evaluate and predict users' response to electronic services (e-service) before developing e-service projects. Furthermore, ETAM is useful to e-service providers in developing strategies and encouraging the use of electronic services, as well as increasing the use and acceptance rate of e-service.

In Taiwan, the TAM model is integrated with the ISSM (information system success model) system to test the acceptance of digital library applications (Chang, Chen, Kao, & Huang, 2016). Many factors influence the digital library system acceptance. This study uses attitude toward usage as an intermediate variable and integrates ISSM and TAM to produce TISSM (Technology Information System Success Model). This new model is used to analyze and explore empirical data. Relevant factors influencing personal usage behaviour and the identification of personal networks benefits are developed to improve digital library services at the Central National Library. This study claims that TISSM is more effective than the TAM or ISSM models. TISSM model proves that attitude toward usage significantly and positively influences perceived usefulness, perceived ease of use, and user satisfaction. However, the quality of information system services and personal networks benefits do not positively and significantly influence attitude toward usage, while they indirectly and significantly affect attitudes towards use through user satisfaction. Chang et al. (2016) concluded that user satisfaction significantly influences attitudes toward usage. Therefore, to strengthen the positive attitude towards usage, the user satisfaction factor becomes key in improving digital library services.

C. METHODS

This study uses a quantitative approach with the TAM (technology acceptance model) model to measure the technology acceptance rate of 4 essential elements, including perceived usefulness, perceived ease of use, intentional behaviour to use, and actual system use. The study involved 26 librarians and 160 students as the research sample. Data collection was conducted through online questionnaires. The collected data was analyzed using Structural Equation Model (SEM), combined with Partial Least Square

(PLS) modelling. The smartPLS software version 3.0 was used to measure the level of influence between variables.

D. RESULTS AND FINDINGS

In this study, perceived usefulness in system use was influenced by 3 variables, including complexity (CO), relevance (RE), and subjective norms (SN). Perceived ease of use was influenced by 3 other variables, including screen design (SD), mobility (MO), and attitude (AT).

The complexity variable was measured by 3 indicators (CO1, CO2, CO3). Relevance was measured by 3 indicators including, RE1, RE2, RE3. Similarly, subjective norms variable was measured by 4 indicators, including SN1, SN2, SN3, and SN4. Furthermore, screen design was measured by 3 indicators, including SD1, SD2, and SD3. The mobility variable was measured by 3 indicators (MO1, MO2, MO3), while the attitude variable was measured by 4 indicators (AT1, AT2, AT3, AT4). Perceived usefulness was measured by 6 indicators (PU1, PU2, PU3, PU4, PU5, PU6), while Perceived Ease of Use was measured by 6 indicators (PEU1, PEU2, PEU3, PEU4, PEU5, PEU6). The intention to use variable was measured by 5 indicators (IU1, IU2, IU3, IU4, IU5), while Actual System Usage was measured by 4 indicators (AU1, AU2, AU3, AU4).

Validity test

Validity test was conducted to determine whether the research instrument used as the accuracy of measuring instruments was appropriate to achieve its goals. The instruments used in the study showed their validity in this test. The validity test was conducted by testing convergent and discriminant validities. A high validity rate using convergent values with a measurement value of loading factor is generally greater than or equal to 0.7. However, for the initial stage of research, the development of a measurement scale with a loading factor of 0.5 to 0.6 is still considered sufficient. Therefore, a loading factor value scale of more than 0.5 was used.

Based on the first outer loading result, there were 10 indicators with output values below 0.5, including AU1 (0.192), AU2 (0.453), CO3 (0.296), IU2 (-0.108), IU3 (0.282), IU4 (0.248), PEU5 (0.406), PEU6 (-0.002), SN2 (0.498) and SN4 (0.476). According to Ghazali (2012), invalid indicators are excluded from the variables. Therefore, a second test of the loading factor was conducted without invalid indicators. Based on the second loading factor, each indicator met the recommended value of more than 0.5. Therefore, all indicators were valid for the next test. Furthermore, the formation of each variable in convergent validity is explained as follows:

1. *Complexity*. This variable consists of CO1, CO2 and CO3. Based on the initial validity test, CO3 was invalid. Therefore, a second test was run by removing CO3. From the validity test results in the figure above, the indicator on the relevant variable (CO1) had a loading value of 0.869, while CO2 had a loading value of 0.808. These results showed that each indicator on relevance variable above 0.5 was valid. CO1 had the most dominant value of 0.869. This shows that respondents mostly felt that using a digital library application could manage information effectively and efficiently.
2. *Relevance*. This variable consists of 3 indicators in the measurement, including RE1, RE2, and RE3. Based on validity test results, the indicator on the relevant variable, RE1, had a loading value of 0.708, RE2 had a value of 0.842, while RE3 produced a loading value of 0.880. Therefore, each indicator of the relevance variable above 0.5 was valid. From the data processing results in the figure above, RE3 had the highest loading value at 0.880. In derivatives variable, RE3 indicates that the information source in the digital library is as needed. This means that the information sources and collections in the Digital Library were in line with the needs of most respondents.
3. *Subjective Norms*. Based on preliminary testing on subjective norm variables, 2 of 4 indicators had values below 0.5. Therefore, a retest was conducted by removing the invalid indicators. Furthermore, indicators of subjective norm variables were measured by SN1 and SN3. Validity test results in the figure above indicate that the loading value on SN1 was 0.932, the SN3 produced a loading value of 0.895. All the tested indicators produced loading values greater than 0.5, meaning they were all valid. Based on the data processing in the figure above, SN1 was more prominent than other indicators, with a value of 0.932. A derivative of SN1 states that someone uses a digital library application that is

promoted by the environment and mass media. Most respondents, therefore, think the mass media influences, someone, in using digital library applications.

4. *Screen Design*. It was measured using 3 indicators, including SD1, SD2, and SD3. From the figure above, the loading values of SD1, SD2 and SD3 were 0.510, 0.911, and 0.919, respectively. The validity test results show that each indicator produced a loading value greater than 0.5. All the indicators on the variable were therefore valid. The greater SD3 value indicated clarity in the interface display of the digital library application. According to this, most respondents felt that the screen display on the digital library was clearly visible, enabling effective usability by students or librarians.
5. *Mobility*. There were 3 indicators that measured mobility variables, including MO1, MO2, and MO3. The validity test results in the figure above show that the indicators on the overall mobility variable had loading values> 0.5 which is worth respectively MO1 (0.674), MO2 (0.701), and MO3 (0.824). The mobility variable indicator was, therefore, valid. The MO3 was more prominent than other indicators, with a value of 0.824. The derivative in MO3 shows that using a digital library application on a mobile device is more flexible than directly visiting the library. According to this, most respondents felt that accessing a digital library proved more flexible in terms of place and time.
6. *Attitude*. It was measured using 4 indicators, including AT1, AT2, AT3 and AT4. From the figure above, the loading factors of AT1, AT2, AT3 and AT4 were 0.833, 0.674, 0.819 and 0.780 respectively. The validity test results show that each indicator produced a loading value greater than 0.5. This suggested that all indicators on the variable were valid. The higher AT1 value indicates that the digital library was useful to the respondents.
7. *Perceived Usefulness*. It was measured by 6 indicators, including PU1, PU2, PU3, PU4, and PU5. Based on the SmartPLS output results in the figure above, the loading factors of PU1, PU2, PU3, PU4, PU5 and PU6 were 0.697, 0.726, 0.794, 0.880, 0.638, and 0.824 respectively. Furthermore, the value of each indicator was> 0.5, meaning that the perceived usefulness variable was valid. PU4 had a higher derivative value than other indicators, suggesting that using a digital library saves energy in managing collections and accessing information.
8. *Perceived Ease of Use*. It was measured by 4 indicators, including PEU1, PEU2, PEU3, PEU4. The SmartPLS output results indicate that the loading values of PEU1, PEU2, PEU3 and PEU4 were 0.859, 0.785, 0.892 and 0.530 respectively. The value of each indicator was> 0.5, meaning that the perceived ease of use variable was valid. PEU3 had a higher value than other indicators, suggesting that using and accessing digital library applications saves time in managing collections or searching for information.
9. *Intention to Use*. Based on preliminary testing on the Intention to Use variable, 3 of the 5 indicators had values below 0.5. Therefore, a retest was conducted by removing the invalid indicators. Indicators on the Intention to Use variable were measured using IU1 and IU5. The loading factors of IU1 and IU5 were 0.942 and 0.627, respectively. Based on the validity test results, each indicator produced a loading value greater than 0.5, meaning that they were all valid. The prominent indicator was IU1, suggesting that librarians always use digital library applications to manage their collections.
10. *Actual System Usage*. Based on preliminary testing of the usage interest variable, 1 of the 4 indicators tested had a value below 0.5. Therefore, a retest was run by removing the invalid indicator. The indicators in the usage interest variables were measured using AU2, AU3, and AU4. The SmartPLS output results indicate that the loading factors of AU3 and AU4 were 0.858 and 0.793, respectively. Furthermore, the value of each indicator was> 0.5, meaning that the actual system usage variable was valid. The AU3 indicator was the most prominent with a value of 0.858. This means that the actual Digilib system is used in meeting the needs of people.

The next test measured the discriminant validity. It was conducted by analyzing the resulting cross-loading value. A model has a high discriminant validity when the cross-loading variable has a higher value than the other variables. Based on the results shown, each indicator measures its latent variable better than the other latent variables. This is indicated by the higher cross-loading value of each indicator to the variable itself than to other variables.

Reliability Test

The reliability test was used to measure the consistency of each question submitted through a questionnaire. Therefore, the test used composite reliability and rule of thumb with a value of 0.6-0.7. The reliability test results are in Table 1:

Table 1. Reliability Test

	Composite Reliability	**Description**
Actual System Usage	**0,811**	Reliable
Attitude	**0,860**	Reliable
Complexity	**0,826**	Reliable
Intention to Use	**0,774**	Reliable
Mobility	**0,769**	Reliable
Perceived Ease of Use	**0,857**	Reliable
Perceived Usefulness	**0,893**	Reliable
Relevance	**0,853**	Reliable
Screen Design	**0,837**	Reliable
Subjective Norms	**0,910**	Reliable

Source: SmartPL Data Processing 3, 2019.

Based on the table above, all indicators meet the test requirements. This is because all indicators in composite reliability have values> 0.7. Therefore, they were reliable.

Structural Model Evaluation (Inner Model*)*

The structural model was evaluated to determine the relationship between latent variables in the research model. The structural model was tested calculating the t-value of the path coefficient and the R-square value with a significance level of 5% or 0.05. T-value is used to test the study hypothesis by comparing it with t-table (1.96).

After testing the validity and reliability of the measurement model, the bootstrapping process is performed on the SmartPLS program to get the t-value. The t-value is further compared with a t-table value of 1.96. The following table shows the t-value for each latent variable relationship.

Table 2 Data Bootstrapping Results

Pathway	**Original Sample (O)**	**T Statistics**	**Description**
AT -> PEU	0,306	2,118	Significant
CO -> PU	-0,372	0,698	Not significant
IU -> AU	0,661	4,996	Significant
MO -> PEU	0,204	0,813	Not significant
PEU -> IU	0,436	1,361	Not significant
PEU -> PU	0,193	0,697	Not significant
PU -> IU	-0,134	0,347	Not significant
RE -> PU	0,353	0,958	Not significant
SD -> PEU	0,314	1,238	Not significant
SN -> PU	0,740	2,648	Significant

Source: SmartPLS Data Processing 3.0, 2019

Based on the table above, 3 latent variable paths have a significant effect because the t-value is more than 1.96. The first latent variable is the Subjective Norms (SN) pathway to the Perceived Usefulness (PU), which has a t-value of 2.648. The second latent variable is the Intention to Use pathway on the Actual System Usage with a value of 4.996. The third variable is the Attitude path to the Perceived Ease of Use with a value of 2.118. The Complexity path to Perceived Usefulness, the Mobility path to Perceived Ease of Use, the Perceived Ease of Use path to Intention to Use, the Perceived Ease of Use path to Perceived Usefulness, the Perceived Usefulness Path to Intention to Use, the Relevance Path to Perceived Usefulness, and the Screen Design path to the Perceived Ease of Use have insignificant relationships because their t-values, 0.698, 0.813, 1.361, 0.697, 0.347, 0.958 and 1.238 respectively, are smaller than the t-table value of 1.96.

After testing the t-value with t-table, the R^2 (R-square) value of each endogenous variable was tested. The R^2 value is used to analyze the extent to which the independent variable explains the dependent variable. In this study, endogenous variables consist of Perceived Usefulness, Perceived Ease of Use, Intention to Use, and Actual System Usage. The R^2 values of each endogenous variable are shown in the table below.

Table 3 R-Square Values

Endogenous Variables	R-Square Value
Actual System Usage	0,072
Intention to Use	0,299
Perceived Ease of Use	0,283
Perceived Usefulness	0,224

Source: SmartPLS 3.0 Data Processing, 2017

The R^2 value shows the extent of an exogenous variable's effect on the endogenous variable. The R^2 value for Perceived Usefulness in Table 13 is 0.224, meaning that the Relevance, Subjective Norms, and Perceived Ease of Use variables influence the Perceived Usefulness variable by 22.4%. In comparison, the remaining 77.6% is influenced by other variables outside this study. Furthermore, the Mobility and Screen Design variables influence 28.3% of the Perceived Ease of Use variable, while other variables influence 71.7%. Similarly, 29.9% of the Intention to Use variable is influenced by the Perceived Ease of Use and Perceived Usefulness variables, while other variables influence the remaining 70.1%. The Intention to Use variable explains 7.2% of changes in the Actual System Usage variable, while other factors outside this study influence 92.8%.

Based on pre-existing testing, 3 of the 10 tested pathways have a significant and acceptable effect, while the remaining 7 pathways are insignificant and therefore rejected. Therefore, the acceptance rate of the Digital Library in the North Sumatra State Islamic University Library is still very low. This means that Digital Library users have not fully embraced this application. However, it is necessary to improve and review the factors that influence users in utilizing the Digital Library application.

D. DISCUSSION

Results on quantitative data analysis show that user acceptance of the Digilib system by students and librarians is still very low. This means that other factors influence the use of Digilib system in the library. Also, the use of the system is influenced by the user's decision to maintain its utilization.

The TAM model used in this study is an analytical tool that measures the acceptance of technology or innovation. It involves the innovation diffusion theory to understand the user's decision to utilize the Digilib system.

Mass media is an external factor influencing the decision to use the system. The mass media is a variety of information obtained by librarians from various sources. According to this information, using library systems in managing and providing services increases the effectiveness and efficiency of basic tasks, as well as improving self-image and self-esteem. Furthermore, social networks largely influence people's decisions to adopt innovation. Information technology is one form of innovation that continuously adjusts to human needs. The technology usage to alleviate human work is disseminated from one person to another through a communication network, as part of the innovation diffusion process. According to various studies on the dissemination of innovation, people's decision to adopt an innovation is not based on scientific research. Rather, it is based on the subjective assessment results of people that have used the innovations first. This shows that the core of the diffusion process is the imitation by potential people that adopt the use of innovation from others, especially through social networks (Rogers, 1995, p. 18)

In line with the influence of social networks on people's decision to adopt innovation, there are 4 factors influencing the rate of innovation adoption, Rong and Mei (2013). First, the innovation adoption rate is increased by a network of collaborators or competitors. This makes people to be emblazoned on the innovation they adopt. Second, the innovation adoption rate increases with the proportion of competitors and innovation collaborators adopted by users. Social influences are the main impetus in innovation diffusion. Third, the measurement of prestige against the innovation network has a stable negative coefficient. This means that people with high innovation standards are less likely to adopt

innovations quickly. Finally, the features provided in an innovation network strongly influence adoption, even when combined with baselines and social features.

E. CONCLUSION

Based on these research findings, there are several recommendations submitted as outlined below.

The Digilib system currently used by librarians and students of UIN Sumatra Utara needs to be re-evaluated and adjusted to the demands and current standards. Libraries should consider replacing older, less efficient systems with new ones to suit their current needs.

Policymakers in the library should pay serious attention to the current system in use and conduct regular reviews to ensure the system runs as expected.

Librarians should pursue self-learning or participate in training to improve their knowledge and skills in utilizing digital library systems.

University leaders should appoint new library employees with experience in computer science or information systems to back up various problems encountered in the use of information and communication technology.

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